NON-PUBLIC?: N
ACCESSION #: 9004190017

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Prairie Island Nuclear Generating Plant PAGE: 1 OF 4
Unit 2

DOCKET NUMBER: 05000306

TITLE: Unit 2 Reactor Trip During Startup Caused by a Failed Reactor Protection Logic Relay
EVENT DATE: 03/09/90 LER #: 90-002-00 REPORT DATE: 04/09/90

OTHER FACILITIES INVOLVED: Prairie Island Unit 1 DOCKET NO: 05000282

OPERATING MODE: N POWER LEVEL: 6

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Arne A. Hunstad TELEPHONE: (612) 388-1121

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: JC COMPONENT: RLY MANUFACTURER: W120
REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On March 9, 1990, Unit 2 was being restarted following the unit trip on March 8 (Unit 2 LER 90-001). Reactor power was about 6% and the turbine had just been tripped as part of turbine control system testing that is performed at each startup. When the turbine was relatched, at 0128, the reactor tripped. Cause of the trip was determined to be a failed relay, which was then replaced. Logic testing then took place to prove operability of the new relay. After the logic testing, visual observation of some permissive relays showed that two relays, one in each train, were not in their proper positions. These two relays were replaced and tested for proper operation. The Unit was restarted and returned to service at 0928 on March 10, 1990.

Cause of the event was failure of a Westinghouse NBFD relay. The failed

relays were replaced.

END OF ABSTRACT

EVENT DESCRIPTION

On March 9, 1990, Unit 2 was being restarted following the unit trip on March 8 (Unit 2 LER 90-001). Reactor power was about 6% and the turbine had just been tripped as part of turbine control system testing that is performed at each startup. When the turbine was relatched, at 0128, the reactor tripped. Cause of the trip was determined to be a failed relay (EIIS Component Identifier: RLY), which was then replaced. Logic testing then took place to prove operability of the new relay. After the logic testing, visual observation of some permissive relays showed that two relays, one in each train, were not in their proper positions. These two relays were replaced and tested for proper operation. The Unit was restarted and returned to service at 0928 on March 10, 1990.

CAUSE OF THE EVENT

Cause of the event was failure of a Westinghouse NBFD relay. Operation of the turbine stop valves causes position follower relays in the reactor protection system to change state, indicating the status of the turbine to the reactor protection logic (EIIS System Code Identifier: JC). When the stop valve closed as a part of the startup surveillance test, the stop valve relay in reactor protection (2SV2-XB) failed. The mode of failure was a shorted coil. The coil failure occurred when the magnetic field dissipated in the relay coil circuit. This type of coil failure has been seen before at Prairie Island and elsewhere, but has resulted in open coils causing a loss of the specific function only. In this case the shorted coil caused the positive supply fuse for Train B reactor protection to open when the turbine was relatched and power was applied to the relay coil of 2SV2-XB. The fuse opening caused a loss of power to Train B reactor protection logic causing all Train B reactor trips to occur simultaneously.

The permissive relay failures were open coils and had no further effect. These relays may have been failed for a period of time without discovery since the permissive relays are normally de-energized at power.

Unit
1 relays are unaffected by this event because a different style relay coil is used.

ANALYSIS OF THE EVENT

Since the unit responded as designed to the reactor trip, there was no effect on health and safety of the public.

This event is reportable pursuant to 10CFR50.73(a)(2)(iv) since this was an unplanned actuation of the reactor protection system.

Relays with the same style coil are used in the Unit 2 safeguards logic circuitry. The safeguards relays are normally de-energized, and are energized to actuate. The failure mode for this style of relay is failure on de-energizing; for that reason, failures are not expected during a demanded safeguards actuation. The safeguards relays are checked after each actuation as a part of startup testing.

CORRECTIVE ACTION

The failed relays and the blown fuse were replaced.

Westinghouse has developed a suitable replacement relay for the style that caused this event. This new relay is now in service at other plants with no problems noted. We plan to install the new relay, Type NBFD-NR in the Unit 2 reactor protection system during the next refueling outage in the Fall of 1990. Additional visual inspections will be performed until that time.

A few of the safeguards relays are energized during surveillance testing. The logic relays that cannot be checked for coil continuity using installed test light circuitry will be visually inspected until a modification can be completed. The NBFD-NR relay cannot be directly applied to the safeguards application. The new style has fewer poles available and fewer contact combinations available. This will cause a significant design effort to install the new relays in safeguards logic. For this reason, other options are being investigated.

The procedure used to test reactor protection logic at hot shutdown will be revised to more easily identify failures of relays that are normally not energized at power. This procedure revision will be complete before the next use of the procedure and by the end of the Unit 2 refueling outage in the Fall of 1990.

FAILED COMPONENT IDENTIFICATION

Westinghouse 125 VDC logic relay Cat No. NBFD 48S, coil style 1271C50G01.

PREVIOUS SIMILAR EVENTS

Previous similar events were reported as Prairie Island LER's 81-20 and 83-6.

ATTACHMENT 1 TO 9004190017 PAGE 1 OF 1

Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401-1927
Telephone (612) 330-5500

April 9, 1990 10 CFR Part 50
Section 50.73

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Unit 2 Reactor Trip During Startup Caused by a
Failed Reactor Protection Logic Relay

The Licensee Event Report for this occurrence is attached.

This event was reported via the Emergency Notification System in accordance with 10 CFR Part 50, Section 50.72, on March 9, 1990. Please contact us if you require additional information related to this event.

Thomas M Parker
Manager
Nuclear Support Services

c: Regional Administrator - Region III, NRC
NRR Project Manager, NRC
Senior Resident Inspector, NRC
MPCA
Attn: Dr J W Ferman

Attachment

*** END OF DOCUMENT ***